

# RAIL

*MOVING AMERICA FORWARD*



# FRA Hydrogen and Fuel Cell Research Program

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# Discussion Overview

- About Federal Railroad Administration
- Research Program Objectives
- Hydrogen for Rail Applications Research
- Questions

# About Federal Railroad Administration

## Federal Railroad Administration (FRA) -

- Agency within US Department of Transportation
- Safety oversight of nation's railroads
- Management and oversight of Amtrak public funding

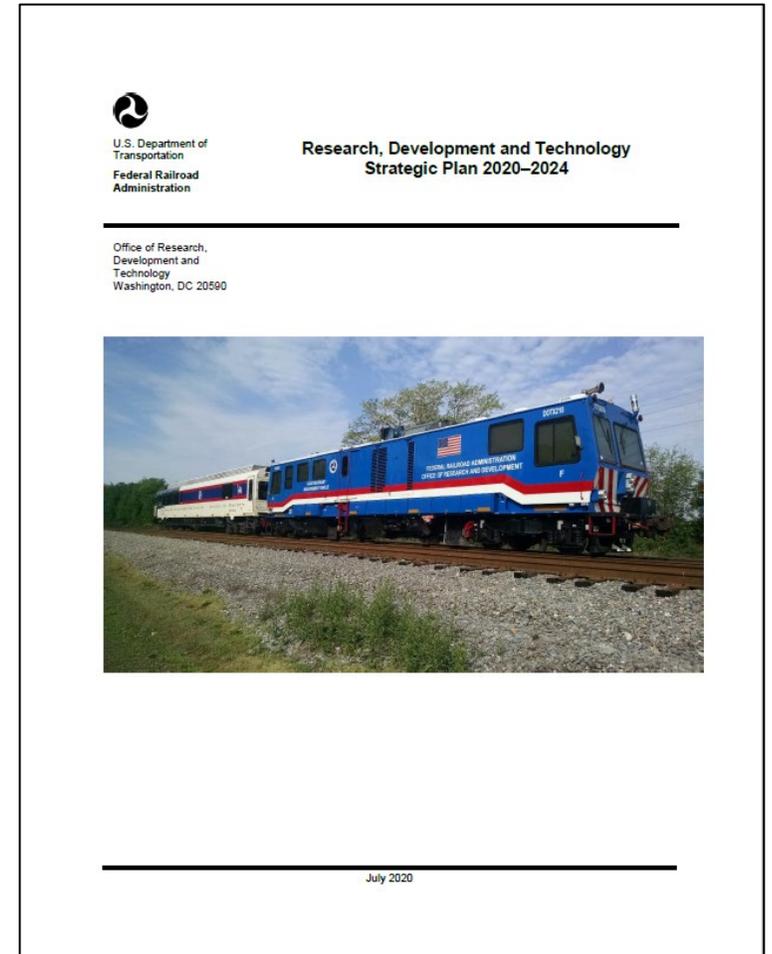


<https://railroads.dot.gov/>

# Office of Research, Development and Technology (RD&T) - Mission

To ensure the safe movement of people and goods by rail through applied research and the development of innovative technologies and solutions.

- Safety is the USDOT's primary Strategic Goal, and thus is the principal driver of the RD&T program.
- Other USDOT Strategic Goals:
  - Economic Strength and Global Competitiveness
  - Equity
  - Climate and Sustainability
  - Transformation
  - Organizational Excellence



# Rail Energy, Engine & Emissions Technology Research Program

## Objectives:

- Promote and support the development of safe, efficient, and reliable alternative fuels and motive power for rail transportation.
- Develop and demonstrate safe and reliable technologies that reduce rail transportation emissions.
- Develop knowledge and tools to address climate change and rail infrastructure resiliency.
- Conduct collaborative research with railroads, small businesses, U.S. Department of Energy and national labs.



# Hydrogen For Rail Applications Research

# Hydrogen Research for Rail Applications

The motivation for the research initiative is that Hydrogen ( $H_2$ ) and fuel cell technologies present the next frontier in alternative fuels for rail that can:

- Reduce rail dependency on fossil fuel
- Improve emissions in rail transportation



**FRA must ensure such technologies are safe!**



# Hydrogen Research for Rail Applications

Most viable near-term rail mode for application of H<sub>2</sub> technology is passenger or switch engine operations:

- Designated terminals at the end of the day
- Shorter range requirement than line-haul rail freight



Sierra Northern Railway Zero Emission Hydrogen Switching Locomotive



# Hydrogen for Rail Applications Research Activities

## North American Railroads Hydrogen Rail Projects:

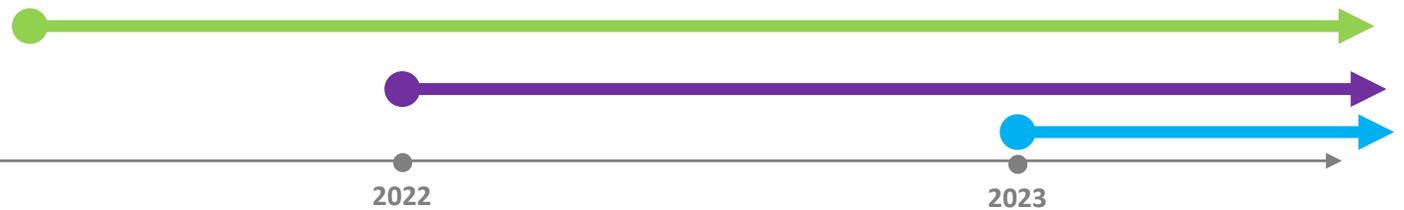
- San Bernardino County Transportation Authority Zero-Emissions Multiple Unit Trainset
- Sierra Northern Railroad
- CPKC Railroad
- Caltrans



### • Impact figures on merits of hydrogen technology in rail:

- DOE HFTO
- Sandia NL

- Assessment of post-crash outcomes for rail
- Operations and maintenance requirements for hydrogen-fueled rail vehicles
- Fuel tender requirements for hydrogen-fueled rail vehicles:
  - Sandia NL



### • Hydrogen dual fuel engine development:

- DOE VTO
- Wabtec
- Oak Ridge NL
- Argonne NL

### • Fires and safety of hydrogen-fueled rail vehicles:

- Sandia NL

### • Crashworthiness of hydrogen-fueled rail vehicles:

- Volpe National Transportation Center
- Ensco, Inc.
- Others



U.S. Department of Transportation  
Federal Railroad Administration  
Sierra Northern Railway Zero Emission Hydrogen Switching Locomotive

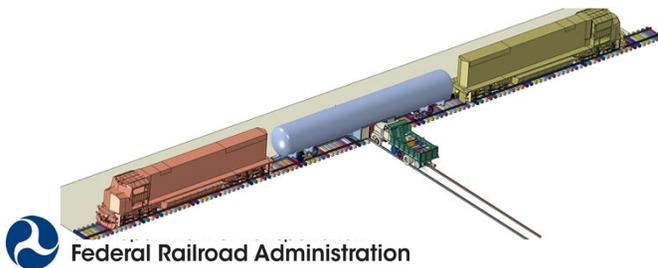


## Example of Research Product – Impact Test of Alternative Fuel Tender

- Highway-grade-crossing collision of liquefied natural gas fuel tender
- 80,000-lb highway truck at 40 mph (69.2 km/h) into protective housing located on tender, which contained LNG fill valves



<https://www.youtube.com/watch?v=j9wnnEwiOLQ>





# QUESTIONS?

# Contact Us

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U.S. Department of Transportation  
**Federal Railroad Administration**